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ORGANOSOLS OF WOLFRAM, MOLYBDENUM, AND ZIRCONIUM IN XYLENE

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[A Digest]

The work reported upon in this paper was carried out at the Laboratory of Colloid Chemistry, Institute of General and Inorganic Chemistry, Academy of Sciences Ukrainian SSR, Kiev.

The known electrical dispersion methods for obtaining organosols of metals do not work when an attempt is made to prepare sols of wolfram, molybdenum, or zirconium in a hydrocarbon medium: decomposition of the dispersing medium occurs and the resulting sols are unstable. Dispersion by means of agitation of a coarsely-dispersed powder of the metal in the organic medium or by application of ultrasonic waves does not lead to completely satisfactory results.

In view of the high melting points of the metals in question their organosols cannot be obtained by the method of vapor condensation in vacuum, and by reason of the difficult isolation in the form of voluminous, black, highly dispersed cathodic precipitates in an aqueous medium, the method of electrolysis cannot be used. On the other hand, colloidal solutions of these metals in water can be obtained without difficulty. If an aqueous colloidal solution of a metal is shaken up with an insoluble liquid, for instance, a hydrocarbon, coagulation takes place and the coagulated metal collects at the interphase of the two immiscible liquids. When the coagulate obtained in this manner has been dried, it can be easily peptized with the aid of an appropriate surface active in the organic solvent which has been used for the precipitation.

The author has successfully applied this principle in the present instance. The hydrosols were prepared by the method of repeated treatment of the finely-dispersed metal powders with acid, alkali, and water (cf. Wedekind, L., Z. Elektrochem., 9, 630, 1903; Kutzel, H., D. P. 186980, 1906). On precipitation with xylene as described above, the coagulated metals were dehydrated with acetone and dried in

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vacuum over phosphorus pentoxide. Coagulation is expedited if some quinine, o-hydroxyquinoline, or phenyl hydrazine is dissolved in the xylene. These substances also aid the peptization in xylene and 0.01-0.04 percent solutions of them in xylene were used in the peptization. Higher concentrations do not enhance the effect. The substances in question probably react with the oxide film of the colloidal particles of metal and form a protective layer. While crude rubber does not peptize the dried metal coagulates by itself, it increases the peptization brought about by the three organic bases mentioned above. This increase can be expressed by a factor of 2.1 in the case of wolfram, 2.7 for molybdenum, and 3.6 for zirconium. The degree of dispersion of the sols in xylene generally speaking corresponds to that of the hydrosols. The optimum temperature of peptization lies between 20 and 30 degrees.

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